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Occupational Epidemiology and Health Outcomes Program

## **Deliverable 5**

### **Report on the Outcome Evaluation for the Western Washington COHE**

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# **Report on the Outcome Evaluation for the Western Washington COHE Executive Summary**

Developing new approaches to delivering workers' compensation health care that offer the potential to reduce worker disability, improve employment outcomes, and promote patient satisfaction has been an important goal of the Department of Labor and Industries (L&I). L&I is sponsoring an ongoing quality improvement system intervention, known as the Occupational Health Services (OHS) project, aimed at reducing worker disability and promoting improved treatment outcomes. This intervention is being tested in two pilot sites:

- Valley Medical Center in Renton, Washington
- St. Luke's Rehabilitation Institute in Spokane, Washington

A research team at the University of Washington is evaluating the OHS project. This report presents the findings of the Renton pilot evaluation. The findings of the Spokane pilot evaluation will be presented in a subsequent report in June 2006.

## **Methods**

### **System Intervention**

Each of the two pilot sites developed a Center of Occupational Health and Education (COHE) to recruit physicians (attending doctors) for the pilot, oversee care and conduct quality improvement activities. The Renton COHE began recruiting physicians in March 2002 and started treating patients in July 2002.

### **Research Design**

To conduct the evaluation, we assessed disability, satisfaction, employment, and cost outcomes of patients treated by COHE physicians relative to outcomes of patients treated

by a comparison-group of non-COHE physicians working within the same Renton pilot area. We defined the 12-month period beginning July 2003 as the evaluation year and tracked patients, on average, for 15 months. We also gathered patient data from a baseline period representing July 2001 through June 2002. These data, along with other data representing patient age, gender, injury type, and physician type, were used to perform multivariate statistical analysis.

### Data, Measures and Analysis

The evaluation is based upon analysis of 22,556 cases treated in the evaluation year, 10,730 COHE cases and 11,826 comparison-group cases. The COHE cases derive from 119 attending doctors recruited for the pilot who treated workers during the evaluation year. The comparison-group consists of all physicians who were known to be attending doctors in the workers' compensation system in the pilot area. For the evaluation year, there were 845 such physicians.

The measures for the evaluation derived from L&I administrative data include:

- % of total cases that went on disability (time loss)
- % of cases on disability at different time points post claim receipt, e.g., 90 days, 180 days, or 360 days
- Duration of disability measured in days from claim receipt
- Disability costs
- Medical costs
- Total costs (sum of medical and disability costs)

As part of the evaluation, we analyzed other measures obtained from specially designed surveys. These measures include:

- Worker satisfaction with health care
- Worker employment outcomes
- Provider satisfaction

We conducted a series of analyses to assess the effects of the COHE. These analyses primarily involved comparison of measures for COHE cases and comparison-group cases

for the evaluation year. All statistical tests were two-sided, with statistical differences defined by p-values of .05.

## Results

The evaluation found important differences favoring the COHE in disability measures, employment outcomes, and medical and disability costs. At the same time, COHE patients were just as satisfied with their care as (comparison-group) patients treated by non-COHE physicians. Further, the physician survey indicated that the majority of COHE physicians were satisfied with the pilot, felt their ability to treat injured workers had improved, and reported greater willingness to treat more injured workers.

Major findings regarding disability and employment outcomes include:

- COHE patients had lower ( $p < .01$ ) incidence of (time loss) disability: 17.8% versus 23.7%
- For carpal tunnel syndrome cases, COHE patients had a greatly reduced ( $p < .01$ ) incidence of disability: 13.2% versus 40.8%
- A smaller proportion of COHE compensable cases were on time loss at 180 days and 360 days: 15.1% versus 18.9% ( $p < .01$ ) and 7.4% versus 9.4% ( $p < .01$ ), respectively
- COHE patients on time loss, on average, had fewer days ( $p < .01$ ) of disability: 76.9 days versus 92.0 days
- COHE patients with carpal tunnel syndrome on time loss had far fewer days of disability: 87.1 days versus 126.8 days
- COHE patients with back sprain treated in the hospital emergency department had lower incidence ( $p < .05$ ) of (time loss) disability: 16.9% versus 34.9%
- COHE patients and non-COHE patients were equally satisfied with regard to perceived quality of care, coordination of care, difficulty in obtaining care, and related satisfaction measures

- COHE patients were 55% more likely ( $p < .05$ ) to return to work for the same employer they worked for at the time of their injury
- COHE patients were 65% more likely ( $p < .05$ ) to be working at the time of the survey (approximately 6 months after claim receipt)

The favorable findings with regard to disability were partly responsible for reduced medical and disability costs<sup>1</sup> among COHE patients:

- Among all (22,556) cases treated in the evaluation year, COHE patients experienced lower medical cost per claim ( $p < .01$ ) and lower disability cost per claim ( $p < .01$ ): \$1,785 versus \$2,167 and \$711 and \$1,209, respectively.
- Among carpal tunnel syndrome cases, these cost differences were even greater: \$1,318 versus \$3,601 ( $p < .01$ ) and \$836 versus \$3,022 ( $p < .01$ ) for medical and disability costs, respectively.
- The evaluation's multivariate statistical analysis estimated savings in cost per claim associated with the COHE of approximately \$585.
- Aggregate net savings, based upon 10,000 patients treated in the evaluation year and administrative costs borne by L&I of \$190,000, are \$5,660,000, or \$566 per case.

## Conclusion

Worker treatment through the Renton COHE led to a substantial reduction in disability incidence and duration, which was associated with improved employment outcomes. These improved disability and employment outcomes also led to significant cost savings. These outcomes were achieved without sacrificing provider choice or diminishing patient satisfaction with health care.

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<sup>1</sup> COHE medical costs include additional costs (\$635,000) billed for activities such as telephone contact with employers, providing health services coordination, and submitting the report of accident form within 2 business days. The differences in costs incorporate these additional billings.

# **Report on the Outcome Evaluation for the Western Washington COHE**

## **Introduction**

Developing new approaches to delivering workers' compensation health care that offer the potential to reduce worker disability, improve health and employment outcomes, enhance clinical efficiency, and promote patient satisfaction has been an important goal of the Department of Labor and Industries (L&I). In its effort to further this goal, L&I has undertaken a number of pilot studies and demonstrations to test system interventions. One of the important demonstrations was the Managed Care Pilot (MCP), which tested the effects on health outcomes, patient satisfaction and medical costs of delivering health care via physician networks organized through managed care arrangements. The MCP showed that using managed care arrangements to organize care through an occupational medicine model<sup>1, 2</sup> could save medical costs, and, more importantly, could reduce worker disability and improve return-to-work outcomes. Because workers in the MCP were limited to designated physician networks for their care, patient satisfaction was lower than it would have been otherwise.<sup>3</sup>

Building on the experience of this pilot and on other scientific information regarding the delivery of occupational health best practices,<sup>4</sup> L&I sought to develop a system intervention aimed at achieving these same outcomes but without restricting in any way the worker's right to choose a physician. Working in collaboration with Business, Labor, and

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<sup>1</sup> Cheadle A, Wickizer TM, Franklin G et al. Evaluation of the Washington State Workers' Compensation Managed Care Pilot Project II: medical and disability costs. *Medical Care*, 1999 Oct;37(10):982-93.

<sup>2</sup> Wickizer TM, Franklin G, Plaeger-Brockway, et al. Improving the quality of workers' compensation health care delivery: the Washington State Occupational Health Services Project. *Milbank Quarterly*, 2001;79(1): 5-33.

<sup>3</sup> Kyes K, Wickizer TM, Franklin G, et al. Evaluation of the Washington State Workers' Compensation Managed Care Pilot Project I: medical outcomes and patient satisfaction. *Medical Care*, 1999 Oct;37(10):972-81.

<sup>4</sup> Loisel P, Abenheim L, Durand P. A population-based, randomized clinical trial on back pain management. *Spine*. 1997 Dec 15;22(24):2911-8.

a research team at the University of Washington, L&I designed a quality improvement intervention known as the Occupational Health Services (OHS) Pilot Project.<sup>1</sup>

The OHS project was intended to be a community-wide quality-improvement intervention that would be implemented through centers of occupational health and education (COHEs). The COHEs were to recruit community physicians, establish mechanisms to identify high-risk cases for long term disability, develop procedures for coordinating care, implement quality indicators, foster communication between providers and employers, offer training to participating physicians, and feedback information to participating physicians on their performance.

L&I developed a request for proposal (RFP) and invited health care organizations to apply for funding to implement COHEs on a pilot basis. Two contracts were awarded to establish pilot COHEs, one at Valley Medical Center in Renton and the other at St. Luke's Rehabilitation Institute in Spokane. The Renton COHE was established over a six-month period beginning in December 2001. It began recruiting physicians in March 2002, and started providing patient care in July 2002. The Spokane COHE began operations approximately a year later.

The University of Washington research team is evaluating the COHEs and is conducting both process and outcome assessments of each pilot site. We completed in June 2003 the process evaluation of the Renton COHE to assess development and early implementation of the pilot at that site. This report presents the findings of the outcome evaluation for the Renton COHE. The outcome evaluation for the Spokane COHE will be completed in June 2006.

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<sup>1</sup> Wickizer TM, Franklin G, Plaeger-Brockway, et al. Improving the quality of workers' compensation health care delivery: the Washington State Occupational Health Services Project. *Milbank Quarterly*, 2001;79(1): 5-33.



Our outcome evaluation was guided by three principal aims:

- To assess the effect of the COHE on the incidence and duration of disability,
- To assess the effect of the COHE on patient satisfaction and employment outcomes,<sup>1</sup> and
- To evaluate the effect of the COHE on medical and disability (time loss) costs.

In addition to these three principal aims, our evaluation also addressed a secondary aim of examining COHE specific activities, such as health services coordination, and other related activities consistent with quality indicators, such as the submission of the report of accident within two business days.

In the sections that follow, we describe the methods used for the evaluation and present the results of analyses conducted to address these aims.

## **Methods**

### **Design**

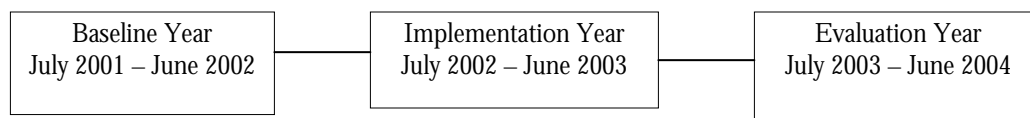
The design we used to conduct the evaluation of the Renton COHE is generally referred to as a “pre-post, comparison-group” design. This design allows the effects of an intervention to be evaluated relative to a comparison group and also allows differences in baseline factors that might affect the outcomes to be adjusted for, thereby strengthening the validity of the findings.

The “pre” and “post” periods covered by the evaluation are shown in the figure below. The pre-period corresponds to the baseline year in the figure and covers the 12-month period July 2001 through June 2002. Implementation of the COHE occurred over a 12-month period beginning in July 2002. During this time the COHE developed an organizational infrastructure and implemented different administrative systems. Insofar as the COHE was

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<sup>1</sup> To address this aim, we conducted a survey of COHE patients. The results of this survey have been previously reported, “Report on patient satisfaction surveys – Western Washington COHE,” (December 2004). This report includes only a brief summary of the findings reported earlier.

not fully implemented at this time, patients treated during this period are not included in this outcome evaluation. The “evaluation year” was defined as the 12-month period beginning in July 2003. Case accrual occurred over this 12-month period. In other words, all incident (new) claims occurring from July 2003 through June 2004 were included in the database constructed for the evaluation. These claims were then tracked through March 2005, providing a follow-up range from 9 to 21 months, with an average follow-up of 15 months.



### *Selection of Comparison Group*

An important initial step in designing the evaluation was to identify a suitable comparison group. After considering a number of options, including the use of an external community as a comparator site, we decided to create a comparison group of attending doctors in the pilot site who were not participating in the pilot.<sup>1</sup> One advantage of selecting attending doctors for the comparison group from the community in which the pilot was located is that it ensured to the extent possible that external factors, such as community health resources, degree of market competition, industrial mix of firms, and employment factors, would be similar for the intervention and comparison groups.

Based upon L&I claims data, we identified 1,065 attending doctors who had at least one claim in the baseline year or evaluation year: 766 attending doctors were listed as the physician on a claim filed in the baseline year and 845 were listed as the attending doctor on a claim filed in the evaluation year (see Table 1 below).

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<sup>1</sup> For purposes of this report, we use the term attending doctor. Attending doctor includes physicians, chiropractic doctors, osteopathic physicians, and registered nurse practitioners. Occasionally the report refers to “physicians” or “community physicians.” This term has the same meaning as attending doctor and includes the same types of providers.

At the time our evaluation was initiated, the Renton COHE had enrolled 130 physicians who were listed as the attending doctor on at least one L&I claim during the baseline year or evaluation year. Of these 130 physicians, 111 treated at least one worker in the baseline year and 119 did so in the evaluation year. Though the number of physicians recruited by the COHE was far less than the number of comparison group physicians, they accounted for roughly the same number of claims (Table 1).

### Data and Measures

We obtained L&I administrative data representing all claims filed during the baseline year and evaluation year that listed a comparison-group attending doctor or a COHE attending doctor. The unit of analysis for our evaluation was the claim. The table below shows the claims for COHE attending doctors and comparison-group attending doctors for the baseline year and evaluation year. As shown, the 130 COHE attending doctors accounted for 20,228 claims, with roughly equal distribution across the baseline and evaluation years. The 1,065 comparison-group attending doctors accounted for 21,861 claims in the baseline and evaluation years. All (1,395) attending doctors in the database accounted for 42,089 claims in the baseline and evaluation years combined.

Table 1. Distribution of Cases by Year for COHE group and Comparison Group

	COHE Group No. Doctors (No. Cases)	Comparison Group No. Doctors (No. Cases)	Total No. Doctors (No. Cases)
Baseline Year	111 (9,498)	766 (10,035)	877 (19,533)
Evaluation Year	119 (10,730)	845 (11,826)	964 (22,556)
Total	130 (20,228)	1,065 (21,861)	1,195 (42,089)

Note: The doctors shown in the table do not represent unduplicated counts.

The primary measures for the evaluation, all derived from L&I administrative data, include:

- % of total cases that went on disability (time loss)
- % of cases on disability at different time points post claim receipt, e.g., 90 days, 180 days, or 360 days
- Duration of disability measured in days from claim receipt
- Disability costs
- Medical costs
- Total costs (sum of medical and disability costs)

COHE attending doctors were reimbursed for performing selected activities consistent with quality indicators established for the pilot.<sup>1</sup> The medical cost data obtained for the evaluation incorporate the higher (differential) reimbursement rates given to COHE attending doctors.

In addition to the claims data described above, we collected administrative (billing) data that reflected the specific activities performed by COHE physicians that were eligible for reimbursement under the pilot. These included health services coordinating activities, use of activity prescription forms, early submission of the report of accident, communication with employers to discuss return to work, and assessment to determine impediments to return to work. As part of our evaluation, we analyzed data pertaining to these activities and report the results below.

### Analytical Approaches

We used bivariate (Chi-square and analysis of variance [ANOVA]) as well as multivariate (regression) statistical techniques to evaluate the effects of the COHE. The primary analysis involves a series of bivariate analyses to compare the COHE group with the comparison group on the measures described above for the evaluation year. These analyses provide information on the nature and magnitude of the differences in the

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<sup>1</sup> Wickizer TM, Franklin G, Mootz R, et al. A communitywide intervention to improve outcomes and reduce disability among injured workers in Washington State. *Milbank Q.* 2004;82(3):547-67.

outcome measures and whether these differences are statistically significant. All statistical tests are two-sided, with statistical significance defined by a minimum p-value of .05.

A number of factors beside the COHE could influence the outcome measures noted above. These factors include patient age and gender, type of physician, and type of injury, as well as baseline differences in physician-level costs and disability duration. To estimate the independent effect of the COHE on costs and incidence and duration of disability, we conducted statistical analyses involving the estimation of linear regression models and logistic regression models. This enabled us to assess the effect of the COHE on the outcomes of interest and at the same time to control for the influence of factors such as patient age and gender, injury type, physicians type, and baseline differences in costs and disability. Additional information about the statistical analysis performed for the evaluation is provided later in the report.

## **Results**

### **Descriptive Information on Study Groups**

Tables 2 – 4 present descriptive information, based on data for the evaluation year,<sup>1</sup> showing the mix of patients, injuries and attending doctors for the COHE cases and comparison cases. As shown in Table 2, there were modest differences in the age-sex profiles of the COHE group and the comparison group. The COHE group had a slightly higher percentage of male workers and workers aged 25 to 34 but had a smaller percentage of workers aged 55 or older.

Table 3 shows the mix of injuries for the two groups. As indicated, COHE physicians treated patients with a somewhat different mix of conditions and injuries. Back sprain was somewhat more common among workers in the comparison group, as was carpal tunnel syndrome, and “other/ill defined” injuries. In contrast, the COHE group included workers who were more likely to have upper extremity fractures and lacerations or contusions. The higher proportion of fractures and lacerations or contusions among COHE cases may result

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<sup>1</sup> Unless otherwise indicated, the data presented in all tables is based upon the evaluation year.

from a larger percentage of these cases being treated through hospital emergency departments.

Table 2. Age-Gender Profile of Study Population

Category	COHE Group (n = 10,730)	Comparison Group (n = 11,826)
% Male *	74.6%	71.2%
% 16-24 *	13.0%	12.4%
% 25-34	30.8%	25.3%
% 35-44	26.3%	25.8%
% 45-54	20.7%	22.4%
% 55+	9.2%	14.1%

\* Differences in gender and age are statistically significant (p < 01).

Table 3. Distribution of Injuries

Injury/Condition	COHE Group (n = 10,730)	Comparison Group (n = 11,826)
Back sprain	13.1% *	16.6%
Carpal Tunnel Syndrome	0.8% *	2.5%
Upper Extremity Fractures	2.6% *	1.9%
Lower Extremity Fractures	1.5% *	1.2%
Lacerations/Contusions	40.8% *	27.8%
Other Sprains	22.6% *	22.9%
Other/Illy Defined Injuries	18.7% *	27.3%

\* Differences are statistically significant (p < 01).

Table 4 shows the distribution of first attending doctor, based upon the L&I billing data. As indicated, COHE patients were more likely to receive initial care from a hospital

emergency room, but were less likely to receive care initially from a chiropractor or surgeon.

Table 4. Distribution of First Attending Doctor

Provider	COHE Group (n = 10,730)	Comparison Group (n = 11,826)
Hospital Emergency Department Physician	50.1% *	28.3%
Chiropractor	1.5% *	9.1%
Primary Care Physician	28.6% *	31.1%
Occupational Medicine Physician	15.9% *	11.7%
Surgeon	3.2% *	5.1%
Other Physician/Provider	0.7% *	12.3%

\* Differences are statistically significant ( $p < .01$ ).

Finally, Table 5 shows the incidence of disability (time loss) for cases treated during the baseline (pre-treatment) period. The table reveals large background differences in the incidence of disability, especially for carpal tunnel syndrome. The difference across all cases and injuries combined ( $n = 19,533$ ) is smaller. Approximately 19% of the COHE cases went on disability time loss compared to 26% of the comparison-group cases. Though not shown in Table 5, the incidence of long-term disability among compensable cases also differed, but these differences were much smaller. Among all compensable cases in the baseline period, 19.8% of the comparison-group patients were on disability at 180 days as compared to 16.5% of the COHE patients ( $p < .05$ ). The difference in the percentage of patients on disability at 360 days, respectively, 14.2% and 12.5%, was not statistically significant.

Table 5. Incidence of Disability (Time Loss) During Baseline Period

Injury/Condition	% of Patients on Disability (Time Loss)	
	COHE	Comp. Group
Back sprain (n = 3,045)	20.5% *	37.3%
Carpal Tunnel Syndrome (n = 360)	16.9% *	40.8%
Fractures (n = 729)	21.3% *	49.1%
Other Sprains (n = 4,546)	19.4% *	30.7%
All Injuries (n = 19,533)	19.31% *	26.3%

\* Differences are statistically significant ( $p < .01$ ).

#### Disability Incidence and Duration for Claims Filed in Evaluation Year

Table 6 presents information concerning the occurrence of disability (time loss) claims for four injury conditions, back sprain, carpal tunnel syndrome, fractures and other sprains, and for injuries overall. The data presented in Table 6 and the tables that follow are based upon claims filed in the evaluation year (July 2003 through June 2004). The data show a clear pattern of reduced disability incidence favoring the COHE group. The differences shown in the table are statistically significant and large in magnitude. For example, 34.3% of the cases with back sprain in the comparison group resulted in a disability claim as compared to 18.2% of the COHE-group cases. There was an even greater disparity in the incidence of disability claims for carpal tunnel syndrome, with 40.8% of these claims resulting in a disability (time loss) claim as compared to 13.2% of the corresponding COHE claims. Overall, 23.7% of the comparison group cases during the follow-up period resulted in a disability claim, as compared to 17.8% of the COHE cases ( $p < .01$ ).



Table 6. Incidence of Disability (Time Loss) Claims for Selected Conditions During the Evaluation Year

Injury/Condition	COHE Group	Comparison Group
Back sprain (n = 3,371)	18.2% *	34.3%
Carpal Tunnel Syndrome (n = 383)	13.2% *	40.8%
Fractures (n = 794)	17.2% *	44.0%
Other Sprains (n = 5,132)	17.9% *	29.2%
All Injuries (n = 22,556)	17.8% *	23.7%

\* Differences are statistically significant ( $p < .01$ ).

Another question of concern to the evaluation was whether among compensable cases the percentage of cases on long-term disability differed between the two groups. This question is addressed in Table 7. Substantial differences in the percentage of cases on disability are shown. For example, 8.3% of the compensable COHE carpal tunnel cases were on disability at 180 days, as compared to 32.8% of the comparison-group cases. Although this difference is large, it is not statistically significant due to the limited number of carpal tunnel syndrome cases analyzed ( $n = 131$ ). One also observes a smaller percentage of COHE cases involving “other sprains” on disability at 180 days and 360 days as compared to comparison-group cases. Overall, among all injury types, 15.1% and 7.4% of the COHE cases were on disability at 180 days and 360 days (post claim receipt), respectively, as compared to 18.9% and 9.4% of the comparison-group cases ( $p < .01$ ). Note while there was little difference for back sprain or fractures between the two groups in the percentage of compensable cases on time loss at 180 days or 360 days, there were large differences in percentage of cases for these two conditions that became compensable (Table 6).

Table 7. Proportion of Patients on Disability at 180 Days and 360 Days among Compensable Cases on Time Loss

Injury/Condition	% on Time Loss at 180 Days		% on Time Loss at 360 Days	
	COHE	Comp. Group	COHE	Comp. Group
Back sprain (n = 928)	16.8%	17.0%	8.2%	8.6%
Carpal Tunnel Syndrome (n = 131)	8.3%	32.8%	16.7%	19.1%
Fractures (n = 232)	13.3%	12.1%	6.7%	5.7%
Other Sprains (n = 1,225)	15.0% *	19.0%	6.0% **	9.7%
All Injuries (n = 4,706)	15.1% **	18.9%	7.4% **	9.4%

\* p < .05; \*\* p < .01

Table 8 shows information on mean (average) and median disability days among compensable (time loss) cases. Consistent with the percentage figures shown in Table 7, COHE cases had fewer average (mean) disability days and fewer median disability days (median represents the 50<sup>th</sup> percentile of the distribution) than comparison-group cases. These differences are most pronounced for carpal tunnel cases. For example, the average carpal tunnel case on disability (time loss) treated through the COHE remained on disability for 87 days. The corresponding figure for the comparison group was 127 days. Though large, this difference did not achieve statistical significance due to the large variance in the data and the limited number of cases. The differences in mean days for “other sprains” and “all injuries” were large and did achieve statistical significance, in part reflecting the larger number of cases analyzed for these two groups. Considering “all injuries” COHE compensable cases, on average, had 77 days of time loss compared with 92 days for comparison-group cases ((p < .05).

Table 8. Mean and Median Disability Days among Compensable (Time Loss) Cases

Injury/Condition	Mean Days		Median Days	
	COHE	Comp. Group	COHE	Comp. Group
Back sprain (n = 928)	85.3	73.8	24	22
Carpal Tunnel Syndrome (n = 131)	87.1	126.8	22	82
Fractures (n = 232)	84	78.1	29	36
Other Sprains (n = 1,225)	75.2*	92.4	25	33
All Injuries (n = 4,706)	76.9*	92.0	25	33

\* p < .05

Tables 9 and 10 present information, based upon warrant data, on the incidence of disability (Table 9) and the proportion of cases on long-term disability among compensable cases (Table 10) by physician volume. The numbers shown below the provider categories represent cases treated during the evaluation year. This analysis is limited to two conditions that accounted for a large percentage of cases treated: back sprain and “other sprains.” The analysis includes two volume strata representing “high volume” physicians and “low volume” physicians, as well as physicians who treated patients through the hospital emergency department. High volume physicians are defined as physicians who treated 500 or more cumulative cases during the implementation year or evaluation year; low volume physicians treated 100 or fewer patients during this same period.

As shown in Table 9, the incidence of disability for patients with back sprain and other sprains was significantly lower for two of the three physician groups: hospital emergency department physicians and low volume physicians. COHE patients treated through the hospital emergency department were approximately 50% less likely to have their claim

become compensable and to go on disability (16.9% versus 34.9%). The difference in incidence of disability was even greater for low volume physicians treating patients with back sprain (11.0% versus 36.7%). The same general pattern is exhibited for patients treated for “other sprains.”

Table 9. Incidence of Disability (Time Loss) for Selected Conditions

Injury/Condition	% of Cases on Disability (Time Loss)	
	COHE	Comparison Group
<u>Back Sprain</u>		
Hospital Emergency Dep't ( n = 733)	16.9% **	34.9%
High Volume Physician (n = 632)	21.2%	17.6%
Low Volume Physician (n = 1,258)	11.0% **	36.7%
<u>Other Sprains</u>		
Hospital Emergency Dep't ( n = 1,269)	16.4% **	28.5%
High Volume Physician (n = 1,074)	18.8%	18.9%
Low Volume Physician (n = 1,583)	18.6% **	31.7%

\*\* p < .01; \* p < .05

Table 10 examines the occurrence of long-term disability among compensable cases for patients with these same two conditions treated by the same three groups of physicians. In general, there was no meaningful pattern of differences for patients with back sprain. The difference in the proportion of patients treated by high-volume physicians who were on disability at 360 days was large, but the difference was not statistically significant due to the limited number of cases (n = 128). For the second condition representing “other sprains,” one observes greater differences in the proportion of cases on long-term

disability. For cases treated by hospital emergency department physicians or by high-volume physicians, the differences in both 180-day disability and 360-day disability were large and statistically significant. For example, whereas 5.7% of COHE cases treated by hospital emergency department physicians were on disability at 360 days, 16.0% of the comparison-group cases were on disability at 360 days ( $p < .01$ ). Similarly, patients with “other sprains” treated by high-volume physicians in the comparison group were three times as likely ( $p < .01$ ) to be on disability at 360 days as patients treated by the same type of physicians in the COHE group.

Table 10. Proportion of Patients on Disability at 180 Days and 360 Days among Compensable Cases on Time Loss for Selected Conditions

Injury/Condition	% on Time Loss at 180 Days		% on Time Loss at 360 Days	
	COHE	Comp. Group	COHE	Comp. Group
<u>Back Sprain</u>				
Hospital Emergency Dep't (n = 169)	18.3%	20.7%	11.0%	11.5%
High Volume Physician (n = 128)	16.3%	23.3%	7.1%	16.7%
Low Volume Physician (n = 422)	17.6%	16.9%	11.8%	7.4%
<u>Other Sprains</u>				
Hospital Emergency Dep't (n = 259)	14.3%*	23.5%	5.7%**	16.0%
High Volume Physician (n = 202)	14.4%**	34.7%	3.9%*	12.2%
Low Volume Physician (n = 477)	13.9%	18.1%	11.1%	8.4%

\*\*  $p < .01$ ; \*  $p < .05$

## Medical Expenses and Disability Costs

Tables 11 and 12 present information on medical and disability costs for claims incurred in the evaluation year for the same four conditions as analyzed earlier (back sprain, carpal tunnel syndrome, fractures, and other sprains) and for claims overall. Table 11 shows medical costs and disability costs for all cases by injury condition. Table 12 shows only aggregate costs for compensable (time loss) claims.

As Table 11 shows, mean medical costs were substantially lower for COHE cases for each of the four conditions. The biggest cost difference was for carpal tunnel syndrome cases. For this condition, comparison-group patients incurred medical costs that were, on average, 2.7 times greater than were medical costs incurred by COHE patients (\$3,601 versus \$1,318). Among all cases ( $n = 10,730$  COHE cases and 11,826 comparison-group cases), the cost difference was smaller, on the order of 21%. As shown in Table 11, COHE cases had an overall average medical cost of \$1,785 compared to \$2,167 for comparison-group cases. Median costs were substantially less than the mean costs, reflecting the relatively large number of cases in the data set with relatively low medical costs. One observes the same general pattern of cost differences favoring COHE cases, however. The one exception to this is overall median medical cost, which was slightly higher for the COHE group (\$527 versus \$463).

The data pertaining to disability costs exhibit the same general pattern, with lower mean disability costs observed for COHE cases. (Note median disability costs are not shown because the majority of claims did not result in sufficient lost work time to incur disability payments. Hence, all median cost values would be zero.) Mean disability costs were lower for each injury group, especially carpal tunnel syndrome, as well as for cases overall. Over all cases, the average (mean) disability cost for comparison-group cases was 70% higher than for COHE cases (\$1,209 versus \$711).

Table 11. Medical and Disability Costs: All Cases

Injury/Condition	<u>Medical Costs</u>		<u>Disability Costs</u>	
	Mean	Median	Mean	Median +
<u>Back Sprain</u>				
COHE Group (n = 1,409)	\$1,768 *	\$511	\$666 *	--
Comparison Group (n = 1,962)	\$2,771	\$864	\$1,676	--
<u>Carpal Tunnel Syndrome</u>				
COHE Group (n = 91)	\$1,318 *	\$454	\$836 *	--
Comparison Group (n = 292)	\$3,601	\$2,406	\$3,022	--
<u>Fractures</u>				
COHE Group (n = 437)	\$1,951 *	\$520	\$684 *	--
Comparison Group (n = 357)	\$3,391	\$1,000	\$1,685	--
<u>Other Sprains</u>				
COHE Group (n = 2,420)	\$1,659 *	\$533	\$698 *	--
Comparison Group (n = 2,712)	\$2,691	\$659	\$1,454	--
<u>All Injuries</u>				
COHE Group (n = 10,730)	\$1,785 *	\$527	\$711 *	--
Comparison Group (n = 11,826)	\$2,167	\$463	\$1,209	--

\* Differences in mean costs are statistically significant ( $p < .01$ ).

+ The median value represents the 50<sup>th</sup> percentile of the distribution . Median disability costs are not shown because fewer than half the cases had any positive disability costs; therefore, median disability costs are zero.

Table 12 shows data on aggregate medical costs and disability costs for compensable (time loss) cases. While mean medical costs (including costs for COHE specific activities that were billed to L&I) for the COHE group and comparison group were similar, mean disability costs were significantly less ( $p < .01$ ) for COHE cases (\$3,999 versus \$5,111). Though not shown in Table 12, we also examined aggregate medical costs for non-compensable cases (by definition disability costs for non-compensable cases are zero). The mean medical cost for COHE cases was \$807 compared to \$881 for comparison-group cases ( $p < .01$ ).

Table 12. Aggregate Medical and Disability Costs for Compensable (Time Loss) Cases

Injury/Condition	Medical Costs		Disability Costs	
	Mean	Median	Mean	Median
COHE Group (n = 1,909)	\$6,301	\$3,002	\$3,999 *	\$961
Comparison Group (n = 2,797)	\$6,318	\$3,324	\$5,111	\$1,352

\*  $p < .01$ .

### COHE Activities

As part of our evaluation, we gathered billing data on COHE specific activities that were performed to improve coordination of care and implement occupational health best practices consistent with quality indicators developed for the OHS pilot. The specific activities tracked through billing data included:

- Submission of the report of accident within two business days
- Use of activity prescription forms at each visit
- Telephone communication with employers
- Assessment of impediments to return to work at 4 weeks of time loss
- Occupation health education with health experts or mentors
- Health services coordination



Of the 10,730 COHE claims filed during the evaluation year, one or more of the above activities were performed on 9,104 (85%) claims. On average, 1.95 activities were performed per claim, representing 20,879 total billed activities (does not include routine submission of the report of accident in more than two business days). The number and percentage of claims for which a COHE activity was billed are shown in Table 13. Note the same activity could be billed more than once for a claim, e.g., use of the activity prescription form or telephone consultation with the employer. The counts given in Table 13 reflect the number of claims for each activity type for which one or more bills were submitted. Therefore, the total count in Table 13 is 16,616, not 20,879. As shown, submission of the report of accident within two business days occurred most often (55%), followed by use of activity prescription forms (46%) and telephone consultation with employers (30%). Approximately 8% of the evaluation-year claims included a charge for some health services coordination activity. The average cost per claim (across all 10,730 claims) for these COHE activities was \$59. The aggregate cost across all claims was \$635,546.

Table 13. Distribution of COHE Activities

Activity Type	No. Claims (n = 16,616)	% of Evaluation Year Claims (n=10,730)
Submission of report of accident with 2 business days	5,945	55.4%
Use of activity prescription forms	4,927	45.9%
Telephone consultation with employer	3,207	29.9%
Telephone consultation with patient	838	7.8%
Health services coordination	804	7.5%
Medical conference	204	1.9%
Return-To-Work assessment	119	1.1%
Other activities	571	5.3%

## Results of Statistical Analysis

The information presented earlier indicated that injured workers treated through the Renton COHE were less likely to go on disability (time loss) than comparison-group workers. Further, COHE patients with compensable claims were less likely to experience long-term disability. As shown in Table 11, among all cases medical costs and disability costs for COHE patients were, respectively, \$382 and \$498 less than for comparison-group patients. Combining medical costs and disability costs would lead to an approximate difference in total costs of \$880 per case.

Not all of this cost difference is likely to be associated with the COHE, however. As Tables 2 – 5 show, there were differences in a number of factors between the COHE group and the comparison group, including differences in patient age and gender mix (Table 2), differences in injury and physician mix (Tables 3 and 4), and differences in baseline occurrence of disability (Table 5). These differences may account for some of the observed difference in costs, as well as other differences in disability reported in Tables 5 – 7.

To develop a more valid assessment of the effect of the COHE on costs and disability, we tested a series of statistical models that allowed us to generate estimates of the difference in costs and disability associated with the COHE, controlling for the factors described earlier. Three models were estimated: (1) a multiple linear regression model with total costs (medical costs plus disability costs) specified as the dependent variable; (2) a logistic regression model (for all cases) with the dependent variable expressed in binary form indicating whether the case became compensable; and (3) a logistic regression model (for compensable cases only) with the dependent variable expressed in binary form representing whether the worker was on disability at 360 days post claim receipt.

In estimating these models, we controlled for the following factors:

- Age-gender mix
- Injury type

- Type of first attending doctor
- Physician volume
- Baseline-year average total costs (medical costs plus disability costs) per physician<sup>1</sup>

We sought to identify two types of COHE effects: (1) a “recruitment effect” resulting from the COHE’s efforts to recruit physicians interested in and committed to the pilot and its goals of improving occupational health care for injured workers, and (2) a “program operational effect” resulting from the ongoing activities of the COHE such as health services coordination. Our statistical model enabled us to estimate both effects for our cost analysis.

Summarized below (Table 13) are the results of our statistical analysis. As shown, the COHE was associated with a “recruitment effect” of \$125 per claim. In other words, the COHE’s efforts to recruit physicians committed to the goals of the pilot translated into the delivery of care that, on average, yielded costs that were \$125 lower per claim ( $p < .01$ ) independent of other COHE activities. In addition, we estimated the COHE “program operational effect” to be \$460 per claim ( $p < .01$ ). These two effects are additive; the total COHE effect would therefore be approximately \$585 per claim. This estimate implies that two-thirds of the \$880 difference in total costs reported in Table 11 could be attributed to the effects of the COHE, with the other one-third attributable to other factors such as patient age, type of doctor, injury type and physician volume.

The other two measures included in Table 13 are consistent with the information provided earlier in Tables 6 and 7. The statistical analysis indicated that controlling for the effects of the factors noted above, COHE patients were 17% less likely to go on disability as comparison-group patients. This effect was highly significant ( $p = .001$ ). The estimated effect of the COHE on long-term disability was somewhat larger but of borderline

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<sup>1</sup> Total costs were highly correlated ( $r > .90$ ) with disability days, so only the cost measure was included in the regression model.

statistical significance. The analysis implies that COHE patients were 23% less likely to be on disability at 360 days ( $p = .07$ ).

Table 13. Abridged Results of Statistical Analysis of Costs and Disability

Outcome Measure	Estimated Coefficient	Odds Ratio	P-Value
COHE recruitment effect	- \$125	NA	.001
COHE program operational effect	- \$460	NA	.001
Likelihood of case becoming time loss claim	-.184	0.83	.001
On disability at 360 days among compensable cases	-.254	.77	.07

As part of our analysis, we explored whether submission of the report of accident within two days affected the incidence of disability.<sup>1</sup> Timely submission of the report of accident was found to have an important effect on the incidence of disability. Thirty-seven percent of all (22,556) cases treated in the evaluation year had the report of accident submitted within two business days. But COHE physicians submitted the report within two business days much more frequently. Whereas 17.3% of the comparison-group cases had the form submitted within two business days, 55.4% of the COHE cases did so ( $p < .01$ ). Timely submission of the report of accident reduced the likelihood of a case becoming a compensable claim. Almost 23% (22.6%) of the cases that did not have the report of accident submitted within two business days became compensable as compared to 17.8% of those that did ( $p < .01$ ). On a relative basis, timely submission of the report of accident reduced the incidence of time loss by approximately 21%.

<sup>1</sup> It was not feasible to assess the individual effects of other COHE specific activities because we were not able to adequately control for unmeasured “selection effects.” For example, COHE cases that received health services coordination were by definition different from COHE cases that did not receive coordination. There was not practical method of controlling for these differences. This same problem does not arise with the analysis of the submission of the report of accident.

## Effects of COHE on Worker Satisfaction and Employment Outcomes

As noted at the beginning of this report, one of the aims of the outcome evaluation was to assess worker satisfaction and employment outcomes for the COHE. This was done through a patient satisfaction survey administered over several months beginning in May 2004. The survey respondents, selected on the basis of the initiation of their treatment, included 520 COHE patients and 473 comparison-group patients who received medical care from a non-COHE attending doctor. The detailed results of this survey were reported earlier to L&I in a separate report.

We found no meaningful differences in satisfaction between COHE patients and comparison-group patients. In general, both groups of patients were quite satisfied with the quality of the care they received. Although there were no significant differences in satisfaction between the COHE patients and the comparison-group patients, there were differences in employment outcomes. COHE patients were 55% more likely ( $p < .05$ ) to return to work for the same employer for whom they were working at the time of their injury and they were 65% more likely ( $p < .05$ ) to be working at the time of the interview (approximately 6 months after claim receipt). COHE patients also reported having better recovery status than comparison-group patients but the difference in recovery status did not achieve statistical significance.

## Physician Satisfaction

As part of our evaluation, we conducted a limited survey of COHE physicians in the spring of 2004 to assess their general satisfaction with the pilot. At the time of the survey 125 physicians were participating in the pilot, each of whom was sent a mailed questionnaire. Sixty-nine percent (86) returned the questionnaire. Sixty-five percent of the respondents were medical doctors, 25% were chiropractic doctors, and the remaining 10% represented other providers. The responses to the survey were favorable and indicated that the majority of physicians felt their participation in the pilot was valuable. For example, 75% of the respondents indicated their ability to treat injured workers had improved since they

became involved in the pilot. Seventy-four percent of the physician respondents indicated they were satisfied with their experience in treating injured workers through the COHE, a 28% increase over the number of respondents indicating satisfaction prior to participating in the COHE. Almost 70% of the physician respondents indicated the COHE experience had improved their ability to communicate with employers. Finally, one-half of the physician respondents indicated that were willing to treat more injured workers as a result of their experience with the COHE.

## **Conclusion**

This report has summarized the findings of our evaluation of the Renton COHE. As part of a broader system innovation designed by L&I to improve quality and foster occupational health best practices, the COHE was intended to reduce disability among injured workers. Drawing on administrative data obtained from L&I, we compared the performance of the COHE to that of a comparison group of physicians delivering care in the same general area as that served by the COHE. We focused our evaluation on assessing disability patterns, worker satisfaction and return to work, disability costs, and medical costs.

The findings reported here indicate the COHE was associated with a number of positive outcomes. COHE patients were less likely to incur time loss and also less likely to incur long-term disability. These favorable patterns led to an estimated reduction in total costs (medical costs plus disability costs) of approximately \$460 per claim (including additional costs billed by the COHE for coordination activities, phone communication and related activities), based upon the statistical analysis described earlier. In addition, the COHE's recruitment efforts led to the voluntary decision of 130 community physicians to participate in the pilot. These physicians exhibited different practice patterns than comparison-group physicians, leading to a lower incidence of time loss (Table 5), even before the pilot started. We estimated that this "recruitment effect" translated into costs per claim (medical and disability) that were \$125 less during the evaluation year. Thus the total cost-per-claim difference associated with the COHE was \$585 (\$460 plus \$125).

The COHE treated approximately 10,000 workers during the evaluation year. Therefore, the aggregate reduction in costs associated with COHE operations would be on the order of \$5,850,000. Allowing for \$190,000 in administrative expenses L&I made available through the COHE contract for the evaluation year would reduce aggregate savings to \$5,660,000. Thus, the net savings per case would be approximately \$566.

A further question concerns the source of the estimated cost savings in regard to the COHE's apparent effect in reducing disability. The statistical analysis suggested that the COHE was associated with a reduction in the incidence of time loss as well as a reduction in long-term time loss among compensable cases. Both of these effects would lead to reduced disability costs, and perhaps to a reduction in medical costs. The data presented in Tables 11 and 12, combined with our statistical analysis, suggest that much of the savings derives from reducing disability, both the incidence of time loss and the incidence of long-term disability. There was no difference in average medical cost among compensable cases between COHE cases and comparison-group cases (Table 12). However, as noted in the text, there was a difference of \$80 in medical costs among non-compensable cases.

We conducted additional statistical analysis not reported in the text, dividing the study population into non-compensable cases and compensable cases. We then estimated the same linear regression model as described before for the two types of cases. There was little meaningful difference in costs for non-compensable cases, but there was a very large difference in total costs for compensable cases of borderline statistical significance. This analysis supports the notion that much of the cost savings reported here derive from reducing the incidence of time loss and long-term disability among injured workers.

The results reported here compare very favorably with those reported for the managed care pilot. The evaluation of that demonstration found estimated medical savings on the order of \$160 per case, and savings in disability costs of \$285 per case, or \$445 total savings per

case. The findings of this evaluation suggest net cost savings associated with the COHE are on the order of \$566 per case—25% higher than the cost savings associated with the managed care pilot. However, unlike the managed care pilot, the COHE did not restrict the workers' choice of physician in any way. More importantly, unlike managed care patients, COHE patients were not any less satisfied with the care they received.

In sum, it appears possible to substantially reduce disability among injured workers, and thereby save resources, without sacrificing provider choice or diminishing patient satisfaction.